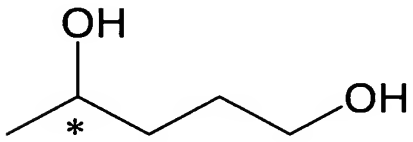
[0078]

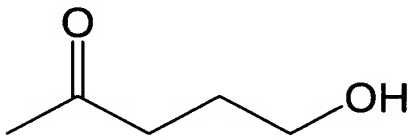
CLAIMS

1. A process for producing an optically active 1,4-pentanediol represented by formula (2):



(2)

(wherein * represents an asymmetric carbon atom) comprising asymmetrically reducing 5-hydroxy-2-pentanone represented by formula (1):



(1)

[0079]

2. The process according to claim 1, wherein 5-hydroxy-2-pentanone represented by said formula (1) is asymmetrically reduced by the action of an enzyme source having the activity of stereoselectively reducing the compound.

[0080]

3. The process according to claim 2, wherein the enzyme source is a cultured product of a microorganism belonging to genus Candida, genus Devosia, genus Rhodococcus, or genus Rhodotorula and/or an enzyme obtained from any of these microorganisms.

[0081]

4. The process according to claim 2, wherein the enzyme source is a cultured product of a microorganism that has the activity of selectively reducing the compound represented by said formula (1) to produce the S-isomer and that belongs to genus Rhodococcus or genus Rhodotorula and/or an enzyme obtained from any of these microorganisms.

[0082]

5. The process according to claim 4, wherein the enzyme source that selectively produces the S-isomer is a cultured product of Rhodococcus sp. or Rhodotorula glutinis and/or an enzyme obtained from any of these microorganisms.

[0083]

6. The process according to claim 4, wherein the enzyme source that selectively produces the S-isomer is a cultured product of Escherichia coli HB101 (pNTRS) (FERM BP-08545) or Escherichia coli HB101 (pNTRGG1) (FERM BP-7858) and/or an enzyme obtained from any of these microorganisms.

[0084]

7. The process according to claim 2, wherein the enzyme source is a cultured product of a microorganism that has the activity of selectively reducing the compound represented by said formula (1) to produce the R-isomer and that belongs to genus Candida or genus Devosia and/or an enzyme obtained from any of these microorganisms.

[0085]

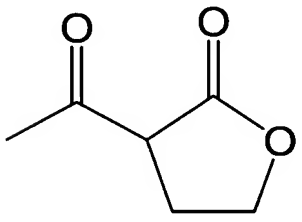
8. The process according to claim 7, wherein the enzyme source that selectively produces the R-isomer is a cultured product of Candida malis, Candida magnoliae, or Devosia riboflavina and/or an enzyme obtained from any of these microorganisms.

[0086]

9. The process according to claim 7, wherein the enzyme source that selectively produces the R-isomer is a cultured product of Escherichia coli HB101 (pNTS1G) (FERM BP-5835), Escherichia coli HB101 (pNTFPG) (FERM BP-7117), or Escherichia coli HB101 (pNTDRG1) (FERM BP-08458) and/or an enzyme obtained from any of these microorganisms.

[0087]

10. The process according to any one of claims 1 to 9, wherein 5-hydroxy-2-pentanone represented by said formula (1) produced by hydrolyzing 2-acetyl-γ-butyrolactone represented by formula (5):

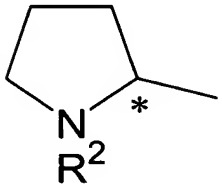


(5)

in the presence of an acid is used as a starting material.

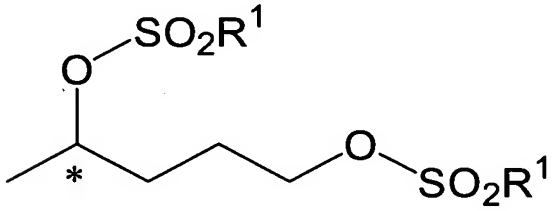
[0088]

11. A process for producing an optically active 1-substituted 2-methylpyrrolidine represented by formula (4):



(4)

(wherein R^2 represents a hydrogen atom, a hydroxyl group, a methoxy group, a benzyloxy group, a substituted or unsubstituted alkyl group having 1 to 12 carbon atoms, a substituted or unsubstituted aralkyl group having 7 to 12 carbon atoms, or a substituted or unsubstituted aryl group having 6 to 12 carbon atoms, and * represents an asymmetric carbon atom) comprising sulfonylating the optically active 1,4-pentanediol represented by said formula (2) produced by any one of the processes according to claims 1 to 10 to convert it to an optically active disulfonate compound represented by formula (3):



(3)

(wherein R^1 represents a substituted or unsubstituted alkyl group having 1 to 12 carbon atoms, a substituted or unsubstituted aralkyl group having 7 to 12 carbon atoms, or

a substituted or unsubstituted aryl group having 6 to 12 carbon atoms, and * represents an asymmetric carbon atom), and reacting the compound with an amine.

[0089]

12. The process according to claim 11, wherein R^1 is a methyl group or a 4-methyphenyl group and R^2 is a benzyl group.